Atrial fibrillation: the management of atrial fibrillation

NICE guideline

First draft for consultation, October 2005

If you wish to comment on this version of the guideline, please be aware that all the supporting information and evidence is contained in the full version.
Introduction

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia and is a significant risk factor for stroke and other morbidities if left untreated. This guideline offers evidence-based guidance for the diagnosis and management of AF as it occurs in emergency, primary, postoperative and secondary care. It also gives recommendations for referral to specialist services. It does not provide guidance for paediatric or gestational AF.

This guideline also offers guidance on the management of atrial flutter, which is a cardiac arrhythmia closely related to AF. Unless specifically indicated otherwise, those recommendations made for AF may be assumed to apply also to atrial flutter.
Patient-centred care

This guideline offers best practice advice on the care of adult patients with atrial fibrillation (AF).

Treatment and care should take into account patients' individual needs and preferences. People with AF should have the opportunity to make informed decisions about their care and treatment. Where patients do not have the capacity to make decisions, healthcare professionals should follow the Department of Health guidelines – *Reference guide to consent for examination or treatment* (2001) (available from www.dh.gov.uk).

Good communication between healthcare professionals and patients is essential. It should be supported by the provision of evidence-based information offered in a form that is tailored to the needs of the individual patient. The treatment, care and information provided should be culturally appropriate and in a form that is accessible to people who have additional needs, such as people with physical, cognitive or sensory disabilities, and people who do not speak or read English.

Unless specifically excluded by the patient, carers and relatives should have the opportunity to be involved in decisions about the patient's care and treatment.

Carers and relatives should also be provided with the information and support they need.
Key priorities for implementation

The following recommendations have been identified as priorities for implementation.

- An ECG should be performed on all patients in whom a diagnosis of AF is suspected based on the detection of an irregular pulse.

- As some patients with persistent AF will satisfy criteria for either an initial rate or rhythm control strategy (for example, age over 65 but also symptomatic):
  - the indications for each option should not be regarded as mutually exclusive and the potential advantages and disadvantages of each strategy should be explained to patients before agreeing which to adopt
  - any comorbidities that might indicate one approach rather than the other should be taken into account.

- In patients with permanent AF, who need treatment for rate control:
  - beta-blockers or rate-limiting calcium antagonists should be administered as the preferred initial monotherapy
  - digoxin should only be considered as monotherapy in sedentary patients.

- In patients with persistent AF, appropriate antithrombotic therapy should be administered to patients irrespective of whether a rate control or rhythm control treatment strategy is adopted.

- Patients with AF should be assessed for their risk of thromboembolism, and given appropriate thromboprophylaxis, according to the model below (see stroke risk stratification algorithm, Appendix E).
The following guidance is evidence based. Appendix A shows the grading scheme used for the recommendations: A, B, C, D or good practice point – D(GPP). Recommendations on diagnostic tests are graded A(DS), B(DS), C(DS) or D(DS). A summary of the evidence on which the guidance is based is provided in the full guideline (see section 5).

1 Guidance

For ease of reference, guidance has been split between different types of AF wherever possible. Algorithms for particular types of AF are provided in Appendix E.

1.1 Identification and diagnosis

This section offers guidance on the opportunistic case finding of patients with AF based on presenting symptoms, and the effectiveness of manual pulse palpation as a screening tool for those in whom AF is suspected. Guidance is also offered in terms of the need for echocardiographic assessment in patients with AF.

1.1.1 Presenting symptoms

1.1.1.1 In patients presenting with

- breathlessness/dyspnoea
- palpitations
- syncope/dizziness or
- chest discomfort

manual pulse palpation should be performed to determine the presence of an irregular pulse that may indicate underlying AF. [C]

1.1.2 Pulse palpation

1.1.2.1 An ECG should be performed on all patients in whom a diagnosis of AF is suspected based on the detection of an irregular pulse. [B(DS)]
1.1.3 Echocardiography

1.1.3.1 In patients with AF, transthoracic echocardiography (TTE) should be performed in:

- those in whom a baseline echocardiogram is important for long-term management, such as younger patients [D(GPP)]
- those being considered for a rhythm control strategy including cardioversion (electrical or pharmacological) [C]
- those in whom there is a high risk or a suspicion of underlying structural/functional heart disease (such as heart failure, heart murmur) that influences their subsequent management (such as choice of antiarrhythmic drug) [D(GPP)]
- those in whom refinement of clinical risk stratification for antithrombotic therapy is needed (see section 1.8.6). [C]

1.1.3.2 In patients with AF in whom the need to initiate anticoagulation therapy has already been agreed on appropriate clinical criteria (see section 1.8.6) transthoracic echocardiography should not be routinely performed solely for the purpose of further stroke risk stratification. [D(GPP)]

1.1.3.3 In patients with AF, transoesophageal echocardiography (TOE) should be performed in: [D(GPP)]

- those where TTE demonstrates an abnormality (such as valvular heart disease) that warrants further specific assessment
- those patients where TTE is technically difficult and/or of questionable quality and where there is a need to exclude cardiac abnormalities
- those being considered for TOE-guided cardioversion.

1.1.4 Ambulatory ECG recording

1.1.4.1 In patients with suspected paroxysmal AF undetected by standard ECG recording: [B(DS)]
• a 24-hour Holter monitor should be used in those with symptomatic episodes less than 24 hours apart
• an event recorder ECG should be used in patients with symptomatic episodes more than 24 hours apart.

1.2 Cardioversion

This section offers guidance for those patients with AF undergoing elective cardioversion. It does not cover those patients with haemodynamic instability secondary to AF in whom emergency cardioversion may be indicated (see section 1.6 below). An algorithm relating to this section can be seen in Appendix E.

1.2.1 Electrical versus pharmacological cardioversion

1.2.1.1 In patients with AF without haemodynamic instability in whom cardioversion is indicated:

• within 48 hours of onset either pharmacological or electrical cardioversion should be performed [B]
• the advantages and disadvantages of both pharmacological and electrical cardioversion should be discussed with patients before initiating treatment [D(GPP)]
• with more prolonged AF (over 48 hours) electrical cardioversion should be the preferred initial treatment option. [D(GPP)]

1.2.2 Pharmacological cardioversion

1.2.2.1 In patients with persistent AF, where the decision to perform pharmacological cardioversion using an intravenous antiarrhythmic agent has been made:

• in the absence of structural heart disease, a class 1c drug (such as flecainide) should be the drug of choice [B]
• in the presence of structural heart disease, amiodarone should be the drug of choice. [D(GPP)]
1.2.3 Electrical cardioversion with concomitant antiarrhythmic drugs

1.2.3.1 In patients with AF undergoing elective electrical cardioversion where there is a heightened concern about a successful restoration of sinus rhythm (such as previous failure to cardiovert or early recurrence of AF), concomitant amiodarone or sotalol should be administered. [B]

1.2.4 TOE-guided cardioversion

1.2.4.1 In patients with AF of greater than 48 hours' duration, in whom elective cardioversion is indicated:

- both TOE-guided cardioversion and conventional cardioversion should be considered equally effective [B]
- a TOE-guided cardioversion strategy should be considered:
  - where experienced staff and appropriate facilities are available [D(GPP)]
  - where a minimal period of precadioversion anticoagulation is indicated due to patient choice or bleeding risks. [C]

1.3 Treatment for persistent AF

This section offers guidance for those patients with persistent AF in terms of the most effective treatment strategy and, for those in whom a rhythm control strategy is indicated, the optimal form of post-cardioversion therapy for maintenance of sinus rhythm. It also makes recommendations on the optimal form of pericardioversion thromboprophylaxis. For the optimisation of antithrombotic therapy according to risks and benefits in patients with persistent AF refer to section 1.8.

1.3.1 Rhythm control for persistent AF

1.3.1.1 An antiarrhythmic drug is not required to maintain sinus rhythm in patients with persistent AF in whom a precipitant (such as chest infection, fever, etc.) has been corrected and cardioversion has been
performed successfully, providing there are no risk factors for recurrence. [D(GPP)]

1.3.1.2 In patients with persistent AF who require antiarrhythmic drugs to maintain sinus rhythm and who have structural heart disease:

- a beta-blocker should be administered as the initial treatment option [D(GPP)]
- where a beta-blocker is ineffective, contraindicated or not tolerated amiodarone should be used. [A]

1.3.1.3 In patients with persistent AF who require antiarrhythmic drugs to maintain sinus rhythm and who do not have structural heart disease:

- a beta-blocker should be administered as the initial treatment option [D(GPP)]
- where a beta-blocker is ineffective
  - a Class Ic agent or [C]
  - sotalol [D(GPP)] should be administered
- where other drug classes are ineffective, contraindicated or not tolerated amiodarone should be administered. [B]

1.3.2 Antithrombotic therapy for persistent AF

1.3.2.1 Prior to cardioversion, patients should maintain therapeutic anticoagulation with warfarin (INR 2.5, range 2.0 to 3.0) for a minimum of 3 weeks. [C]

1.3.2.2 Following successful cardioversion, patients should remain on therapeutic anticoagulation with warfarin (INR 2.5, range 2.0 to 3.0) for a minimum of 4 weeks. [D(GPP)]

1.3.2.3 In patients with AF where cardioversion cannot be postponed for 3 weeks:
heparin should be administered and the cardioversion performed, and [D]
warfarin should then be administered for a minimum of 4 weeks post cardioversion. [D(GPP)]

1.3.2.4 In patients with AF who have undergone cardioversion, anticoagulation should be continued for the long term in patients at high risk of AF recurrence or with coexistent stroke risk factors. [D(GPP)]

1.3.2.5 In patients with AF undergoing cardioversion who have a confirmed total AF duration of less than 48 hours, anticoagulation following successful restoration of sinus rhythm is not required. [D(GPP)]

1.3.2.6 Patients with atrial flutter should be administered antithrombotic therapy similar to those with AF. [D(GPP)]

1.3.3 Rate control versus rhythm control

1.3.3.1 As some patients with persistent AF will satisfy criteria for either an initial rate or rhythm control strategy (for example, age over 65 but also symptomatic): [D(GPP)]

- the indications for each option should not be regarded as mutually exclusive and the potential advantages and disadvantages of each strategy should be explained to patients before agreeing which to adopt
- any comorbidities that might indicate one approach rather than the other should be taken into account.

1.3.3.2 In patients with persistent AF, appropriate antithrombotic therapy should be administered to patients irrespective of whether a rate control or rhythm control treatment strategy is adopted. [D(GPP)]

1.3.3.3 A rate control strategy should be the preferred initial option in the following with persistent AF:
• patients over 65 [B]
• patients with coronary artery disease [B]
• patients with contraindications to antiarrhythmic drugs [D(GPP)]
• patients unsuitable for cardioversion¹. [D(GPP)]

1.3.3.4 A rhythm control strategy should be the preferred initial option in the following with persistent AF:

• symptomatic patients [D(GPP)]
• younger patients [C]
• patients with congestive heart failure [A]
• patients presenting for the first time with lone AF [D(GPP)]
• patients with AF secondary to a treated/corrected precipitant. [D(GPP)]

1.4 Treatment for permanent AF

This section offers guidance for those patients with permanent AF in terms of the most effective drugs for pharmacological rate control and thromboprophylaxis. For the optimisation of antithrombotic therapy according to risks and benefits in patients with permanent AF refer to section 1.8.

1.4.1 Rate control for permanent AF

1.4.1.1 In patients with permanent AF, who need treatment for rate control:

• beta-blockers or rate-limiting calcium antagonists should be administered as the preferred initial monotherapy in all patients [A]
• digoxin should only be considered as monotherapy in sedentary patients. [D(GPP)]

¹ Patients unsuitable for cardioversion include those with:
• contraindications to anticoagulation
• structural heart disease (e.g. large left atrium > 5.5 cm, mitral stenosis) that precludes long-term maintenance of sinus rhythm
• a long duration of AF (usually > 12 months)
• multiple failed attempts at cardioversion and/or relapses, even with concomitant use of antiarrhythmic drugs or non-pharmacological approaches
• an ongoing but reversible cause of atrial fibrillation (e.g. thyrotoxicosis).
1.4.1.2 In patients with permanent AF, where monotherapy inadequately controls the heart rate:

- beta-blockers administered with digoxin should be used to control heart rate during normal activities [B]
- rate-limiting calcium antagonists administered with digoxin should be used to control heart rate during normal activities and during exercise. [B]

1.4.2 Antithrombotic treatment for permanent AF

1.4.2.1 In patients with permanent AF a risk–benefit assessment should be performed to inform any decision to give antithrombotic therapy. [D(GPP)]

1.4.2.2 In patients with permanent AF where antithrombotic therapy is given to prevent strokes (see section 1.8.6):

- adjusted-dose warfarin should be given as the most effective treatment [A]
- adjusted-dose warfarin should reach a target INR of 2.5 (range 2.0 to 3.0) [A]
- in patients where warfarin is not appropriate aspirin should be administered at 300 mg/day [B]
- in patients where warfarin is appropriate, aspirin should not be co-administered with warfarin as it provides no additional benefit. [B]

1.5 Treatment for paroxysmal AF

This section offers guidance for those patients with paroxysmal AF in terms of the most effective drugs for the suppression of paroxysms and thromboprophylaxis. It also considers in which patients a ‘pill-in-pocket’ treatment strategy is safe and effective. For the optimisation of antithrombotic therapy according to risks and benefits in patients with paroxysmal AF refer to section 1.8.
1.5.1 Rhythm control for paroxysmal AF

1.5.1.1 In patients with infrequent paroxysms and few symptoms, or where symptoms are induced by known precipitants (such as alcohol, caffeine), a 'no drug treatment' strategy or a 'pill-in-the-pocket' strategy should be considered and discussed with the patient. [D(GPP)]

1.5.1.2 In patients with symptomatic paroxysms (with or without structural heart disease, including coronary artery disease) a beta-blocker should be the initial treatment option. [D(GPP)]

1.5.1.3 In patients with paroxysmal AF and no structural heart disease:

- where beta-blockers do not achieve symptomatic suppression, a Class Ic agent (such as flecainide or propafenone) should be administered [C]
- where neither beta-blockers nor Class Ic agents achieve symptomatic suppression, sotalol should be administered [D(GPP)]
- where neither beta-blockers, Class Ic agents nor sotalol achieve symptomatic suppression, amiodarone should be administered. [B]

1.5.1.4 In patients with paroxysmal AF and coronary artery disease:

- where beta-blockers do not achieve symptomatic suppression, sotalol should be administered [D(GPP)]
- where neither beta-blockers nor sotalol achieve symptomatic suppression, amiodarone should be administered. [B]

1.5.1.5 In patients with paroxysmal AF with poor left ventricular function:

- where beta-blockers are administered as part of the routine management strategy and adequately suppress paroxysms, no further treatment is necessary [D(GPP)]
1.5.1.6 Patients on long-term medication for paroxysmal AF should be kept under review to assess the need for continued treatment and the development of any adverse effects. [D(GPP)]

1.5.2 Treatment strategy for paroxysmal AF

1.5.2.1 In patients with paroxysmal AF, a 'pill-in-the-pocket' strategy should be considered in those who: [C]

- have no history of left ventricular dysfunction, or valvular or ischaemic heart disease
- have a history of infrequent symptomatic episodes of paroxysmal AF
- have a systolic blood pressure greater than 100 mmHg and resting heart rate above 70 bpm
- have the understanding of how to, and when to, take the medication.

1.5.3 Antithrombotic therapy for paroxysmal AF

1.5.3.1 The need for antithrombotic therapy in patients with paroxysmal AF should not be based on the frequency or duration of paroxysms (symptomatic or asymptomatic) but on appropriate risk stratification, as for permanent AF (see section 1.8.6). [B]

1.6 Treatment for acute-onset AF

This section offers guidance for those patients with an acute episode of AF, whether of new onset or not. It considers the need for thromboprophylaxis in such patients as well as the most appropriate emergency intervention in those cases where the AF results in haemodynamic instability.
1.6.1 Acute AF in haemodynamically unstable patients

1.6.1.1 In patients with a life-threatening deterioration in haemodynamic stability secondary to AF, emergency electrical cardioversion should be performed, irrespective of the duration of the AF. [D]

1.6.1.2 In patients with non-life-threatening haemodynamic instability following recent-onset AF:

- electrical cardioversion should be performed [D]
- where there is a delay in organising electrical cardioversion, intravenous amiodarone should be used [D]
- in those with known Wolff–Parkinson–White syndrome: [D(GPP)]
  - flecainide is an alternative for attempting pharmacological cardioversion
  - AV node blocking agents (such as diltiazem, verapamil or digoxin) should not be used.

1.6.1.3 In patients with known permanent AF where haemodynamic instability is caused mainly by a poorly controlled ventricular rate, a pharmacological rate control strategy should be used. [D]

1.6.1.4 Where urgent pharmacological rate control is indicated, intravenous treatment should be with one of the following: [D]

- beta-blockers or rate-limiting calcium antagonists
- amiodarone, where beta-blockers or calcium antagonists are contraindicated or ineffective.

1.6.2 Antithrombotic therapy for acute-onset AF

1.6.2.1 In patients with acute AF who are receiving no, or subtherapeutic, anticoagulation therapy: [D(GPP)]

- in the absence of contraindications, heparin should be started, at initial presentation
• heparin should be continued until full assessment and appropriate antithrombotic therapy started, based on risk stratification (see section 1.8.6).

1.6.2.2 In patients with a confirmed diagnosis of acute AF (less than 48 hours after onset), oral anticoagulation should not be administered if stable sinus rhythm is successfully restored within the same 48-hour period following onset and there are no other risk factors for AF recurrence or stroke. [D(GPP)]

1.6.2.3 In patients with acute AF where there is uncertainty over the precise onset, oral anticoagulation should be used, as for persistent AF (see section 1.3.2). [D(GPP)]

1.6.2.4 In cases of acute AF where the patient is haemodynamically unstable, any emergency intervention should be performed as soon as possible and the initiation of anticoagulation should not delay any emergency intervention. [D(GPP)]

1.7 Postoperative AF

This section offers guidance for both the prophylaxis of post-operative AF using antiarrhythmic drugs, and its treatment. For guidance on the need for thromboprophylaxis in postoperative AF refer to section 1.6 above.

1.7.1 Drug prophylaxis for postoperative AF

1.7.1.1 In the prophylaxis and management of postoperative AF, the appropriate use of antithrombotic therapy and correction of identifiable precipitants (such as electrolyte balance, hypoxia) is recommended. [D(GPP)]

1.7.1.2 In patients undergoing cardiothoracic surgery:

• the risk of postoperative AF should be reduced by the administration of either:
  o amiodarone [A]
  o a beta-blocker [A]
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- sotalol [A]
- a rate-limiting calcium antagonist [B]
  - digoxin should not be used. [B]

1.7.1.3 In patients undergoing cardiac surgery on pre-existing beta-blocker therapy, this treatment should be continued unless contraindications develop (such as postoperative bradycardia or hypotension). [A]

1.7.2 Treatment for postoperative AF

1.7.2.1 In the treatment of postoperative AF, following cardiothoracic surgery, in the absence of any contraindications, a rhythm control strategy should be pursued in the first instance. [C]

1.7.2.2 In patients undergoing non-cardiothoracic surgery, unless contraindicated, postoperative AF should be managed as for acute-onset AF with any other precipitant. [D(GPP)]

1.8 Antithrombotic therapy

This section offers guidance for the most effective antithrombotic therapy in AF patients who have suffered a stroke or transient ischaemic attack (TIA) and asymptomatic patients with AF. It also provides recommendations and an algorithm (see Appendix E) for the optimisation of thromboprophylaxis according to risks and benefits.

1.8.1 Initiating antithrombotic therapy

1.8.1.1 In patients with newly diagnosed AF, in whom antithrombotic treatment is indicated (see section 1.8.6), such treatment should be initiated with minimal delay after the appropriate management of comorbidities. [D(GPP)]

1.8.2 Antithrombotic therapy in post-stroke patients

1.8.2.1 In patients with AF who are either post-stroke, or have had a TIA:

  - warfarin should be administered as the most effective thromboprophylactic agent [A]
• aspirin or dipyridamole should not be administered as thromboprophylactic agents unless indicated for the treatment of comorbidities or vascular disease. [D(GPP)]

1.8.2.2 The decision to treat post-stroke or post-TIA patients with warfarin should only be made after treatment of relevant comorbidities (such as hypertension) and assessment of the risk–benefit ratio. [D(GPP)]

1.8.3 Antithrombotic therapy in acute stroke patients

1.8.3.1 In patients with AF who have had a stroke: [D(GPP)]

• imaging (CT scan or MRI) should be performed to exclude cerebral haemorrhage
• in the absence of haemorrhage, anticoagulant therapy should commence after 2 weeks
• in the presence of haemorrhage, anticoagulant therapy should not be given
• in the presence of a large cerebral infarction, the initiation of anticoagulant therapy should be delayed.

1.8.3.2 In patients with AF who have had a TIA: [D(GPP)]

• imaging (CT scan or MRI) should be performed to exclude recent cerebral infarction or haemorrhage
• in the absence of either, anticoagulant therapy should commence as soon as possible.

1.8.3.3 In all patients with acute stroke or TIA, uncontrolled hypertension should be appropriately managed before the institution of antithrombotic therapy. [D(GPP)]

1.8.4 Antithrombotic therapy for asymptomatic AF

1.8.4.1 In patients with asymptomatic AF, thromboprophylaxis should be administered as for symptomatic AF (refer to section 1.3.2 for persistent AF and section 1.4.2 for permanent AF). [D(GPP)]
1.8.5 Risks of long-term anticoagulation

1.8.5.1 The potential risks and benefits of antithrombotic therapy should be explained to patients. [D(GPP)]

1.8.5.2 The assessment of bleeding risk is recommended as part of the clinical assessment of AF patients prior to starting anticoagulation therapy with particular attention being paid to patients with the following:

- age above 75 years [D]
- concomitant use of antiplatelet drugs (aspirin, clopidogrel) or non-steroidal anti-inflammatory drugs [C]
- multiple other drug treatments (polypharmacy) [C]
- uncontrolled hypertension [C]
- history of bleeding (for example, peptic ulcer, cerebral haemorrhage) [C]
- history of poorly controlled anticoagulation therapy. [D(GPP)]

1.8.6 Risk factors for stroke and thromboembolism

1.8.6.1 Patients with AF should be assessed for their risk of thromboembolism, and given appropriate thromboprophylaxis, according to the algorithm below (see stroke risk stratification algorithm, Appendix E). [C]

1.8.6.2 Risk stratification should be reconsidered whenever individual risk factors are reviewed. [D(GPP)]

1.9 Monitoring and referral

This section offers guidance on the follow-up of patients with AF post-cardioversion and the patients in whom self-management of anticoagulation is safe and effective. It also offers guidance on which patients with AF benefit from referral for specialist non-pharmacological interventions.
1.9.1 Anticoagulation self-management

1.9.1.1 In patients with AF who require long-term anticoagulation, self-management with point of care testing (near patient testing) should be considered only if preferred by the patient and the following criteria are met: [C]

- the patient is both physically and cognitively able to perform the test, or in those cases where the patient is not physically or cognitively able to perform the test, a designated carer is able to do so.
- there is an adequate supportive educational programme is in place to train patients and/or carers
- the patient’s ability to self-manage is regularly reviewed
- the equipment is regularly checked via a quality control programme.

1.9.2 Follow-up post cardioversion

1.9.2.1 Following successful cardioversion of AF routine follow-up to assess the maintenance of sinus rhythm should take place at 1 month and 6 months. [D]

1.9.2.2 At the 1-month follow-up the frequency of subsequent reviews should be tailored to the individual patient based upon the presence of comorbidities and concomitant drug therapies. [D]

1.9.2.3 At 6 months, if patients remain in sinus rhythm and have no other need for hospital follow-up, they should be discharged from secondary care with an appropriate management strategy formulated with their GP. [D]

1.9.2.4 Patients should be advised to seek medical attention if symptoms recur. [D(GPP)]
1.9.2.5  Any patient found at follow-up to have relapsed back into AF should be fully re-evaluated for a rate or rhythm control strategy (see section 1.3.3). [D(GPP)]

1.9.3  Referral

1.9.3.1  Referral for further specialist intervention (for example, pulmonary vein isolation, pacemaker therapy, arrhythmia surgery, atrioventricular junction catheter ablation or atrial defibrillators) should be considered in the following:

- patients in whom pharmacological therapy has failed [B]
- patients with lone AF [B]
- patients with ECG evidence of an underlying electrophysiological disorder (e.g. Wolff–Parkinson–White syndrome). [C]

1.9.3.2  The reasons for referral for specialist intervention or continued drug use should be explained and discussed with the patient. [D(GPP)]

2  Notes on the scope of the guidance

All NICE guidelines are developed in accordance with a scope document that defines what the guideline will and will not cover. The scope of this guideline was established, after a period of consultation, at the start of the guideline development process; it is available from www.nice.org.uk/page.aspx?o=233243

3  Implementation in the NHS

3.1  Resource implications

Local health communities should review their existing practice for AF against this guideline. The review should consider the resources required to implement the recommendations set out in section 1, the people and processes involved, and the timeline over which full implementation is
envisioned. It is in the interests of those with AF that the implementation is as
rapid as possible.

Relevant local clinical guidelines, care pathways and protocols should be
reviewed in the light of this guidance and revised accordingly.

Information on the cost impact of this guideline in England is available on the
NICE website and includes a template that local communities can use
(www.nice.org.uk/CGXXXcosttemplate). [Note: the costing information will
be available when the guideline is published.]

3.2 General

The Department of Health considers implementation of clinical guidelines to
be a developmental standard and this will be monitored by the Healthcare
Commission. The implementation of this guideline will build on the National
Service Frameworks for coronary heart disease in England and Wales and
should form part of the service development plans for each local health
community in England and Wales.

3.3 Audit

Suggested audit criteria based on the key priorities for implementation are
listed in Appendix D, and can be used to audit practice locally.

4 Research recommendations

The Guideline Development Group has made the following recommendations
for research, on the basis of its review of the evidence. The Group regards
these recommendations as the most important research areas to improve
NICE guidance and patient care in the future. The Guideline Development
Group’s full set of research recommendations is detailed in the full guideline
(see section 5).

4.1 Cardioversion

In patients scheduled for elective cardioversion what is the optimal form of
cardioversion, in terms of the pre-cardioversion use of antiarrhythmic drugs,
the mode of cardioversion (electrical or pharmacological), and the cost effectiveness of each procedure?

**Why this is important**

Although cardioversion is the core treatment for many patients with AF, there is little evidence that compares the different modes (electrical and pharmacological), particularly in terms of cost effectiveness. Further, the studies that have considered the efficacy of preloading with antiarrhythmic drugs prior to electrical cardioversion have not reported long-term efficacy in maintaining sinus rhythm, nor the cost effectiveness of this strategy.

### 4.2 Echocardiography

What is the cost effectiveness of performing a routine echocardiographic examination in all newly diagnosed AF patients, compared to only selective examination based on clinical criteria?

**Why this is important**

Echocardiography allows the earlier diagnosis of cardiac abnormalities such as left ventricular impairment than would be possible from signs and symptoms alone. However, no study has addressed the issue of whether performing routine echocardiography on all newly diagnosed AF patients would be cost effective in terms of being able to diagnose and treat heart disease earlier, compared to performing echocardiography only on those patients where there is a clinical suspicion of undiagnosed heart disease.

### 4.3 Anticoagulation with antiplatelet therapy

Is there any additional benefit, in terms of overall vascular events, to combined anticoagulation with antiplatelet therapy for any subgroups of patients with AF such as those with prior myocardial infarction or stent implantation?

**Why this is important**

In the general AF population, the evidence suggests that combined therapeutic anticoagulation with antiplatelet therapy does not reduce the
incidence of stroke or thromboembolism compared to therapeutic anticoagulation alone, although it may increase the incidence of bleeding. However, it is unclear whether there are certain subgroups of patients with AF where the therapeutic effects of combination therapy may be better than either monotherapy. In particular, it is unclear whether combination therapy is justified in those AF patients with stent implantation or a history of MI.

4.4 Pill-in-pocket treatment

What is the clinical and cost effectiveness of pill-in-pocket treatment for those with paroxysmal AF compared to hospital-based administration or continuous antiarrhythmic therapy?

Why this is important

Some patients with paroxysmal AF may have paroxysms infrequently. In these patients, the continuous use of antiarrhythmic drugs to suppress paroxysms may not be justified relative to their toxicity. In these patients, there has been no study undertaken in a UK population to determine whether a pill-in-pocket treatment strategy would be clinically or cost effective compared to either the emergency department administration of treatment or continuous antiarrhythmic drug therapy.

4.5 Anticoagulation in paroxysmal AF

What is the optimal anticoagulation strategy for those patients with paroxysmal AF with infrequent paroxysms and those with more frequent paroxysms?

Why this is important

The frequency of paroxysms in patients with paroxysmal AF varies widely between patients. It remains unclear, however, whether the risk of stroke or thromboembolism is comparable between those patients with only infrequent paroxysms and those with more frequent paroxysms. It is also unclear whether, if the risk of stroke or thromboembolism is less in those with infrequent paroxysms, the use of anticoagulation is justified in such a low-risk group.
5 Other versions of this guideline
The National Institute for Health and Clinical Excellence commissioned the
development of this guidance from the National Collaborating Centre for
Chronic Conditions. The Centre established a Guideline Development Group,
which reviewed the evidence and developed the recommendations. The
members of the Guideline Development Group are listed in Appendix B.
Information about the independent Guideline Review Panel is given in
Appendix C.

The booklet *The guideline development process: an overview for
stakeholders, the public and the NHS* has more information about the
Institute’s guideline development process. It is available from
www.nice.org.uk/guidelinesprocess and copies can also be ordered by
telephoning 0870 1555 455 (quote reference N0472).

5.1 Full guideline
The full guideline, *National Clinical Guideline for the Management of Atrial
Fibrillation*, is published by the National Collaborating Centre for Chronic
Conditions and is available from www.rcplondon.ac.uk/ncc-cc, the NICE
website (www.nice.org.uk/CGXXXfullguideline) and the website of the
National Library for Health (www.nlh.nhs.uk). [Note: these details will apply
to the published full guideline.]

5.2 Quick reference guide
A quick reference guide for health professionals is also available from the
NICE website (www.nice.org/CGXXXquickrefguide) or from the NHS
Response Line (telephone 0870 1555 455; quote reference number N0XXX).
[Note: these details will apply when the guideline is published.]

5.3 Information for the public
A version of this guideline for people with AF and their carers, and for the
public, is available from the NICE website
(www.nice.org.uk/CGXXXpublicinfo) or from the NHS Response Line
6  Related NICE guidance

None.

7  Review date

The process of reviewing the evidence is expected to begin 4 years after the date of issue of this guideline. Reviewing may begin before this if significant evidence that affects the guideline recommendations is identified. The updated guideline will be available within 2 years of the start of the review process.
Appendix A: Grading scheme

The classification of recommendations and the levels of evidence for intervention studies used in this guideline are adapted from the Scottish Intercollegiate Guidelines Network (SIGN 50: a guideline developers’ handbook), and summarised in the tables on page 30).

The classification of recommendations and levels of evidence for the accuracy of diagnostic tests are adapted from The Oxford Centre for Evidence-Based Medicine levels of evidence (2001) and the Centre for Reviews and Dissemination report No. 4 (2001). They are summarised in the tables on page 31 and are being used on a pilot basis.
Classification of recommendations on interventions

<table>
<thead>
<tr>
<th>Recommendation grade</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>• At least one meta-analysis, systematic review, or randomised controlled trial (RCT) that is rated as 1**, and is directly applicable to the target population, or • A systematic review of RCTs or a body of evidence that consists principally of studies rated as 1*, is directly applicable to the target population and demonstrates overall consistency of results, or • Evidence drawn from a NICE technology appraisal</td>
</tr>
<tr>
<td>B</td>
<td>• A body of evidence that includes studies rated as 2**, is directly applicable to the target population and demonstrates overall consistency of results, or • Extrapolated evidence from studies rated as 1** or 1*</td>
</tr>
<tr>
<td>C</td>
<td>• A body of evidence that includes studies rated as 2*, is directly applicable to the target population and demonstrates overall consistency of results, or • Extrapolated evidence from studies rated as 2**</td>
</tr>
<tr>
<td>D</td>
<td>• Evidence level 3 or 4, or • Extrapolated evidence from studies rated as 2*, or • Formal consensus</td>
</tr>
<tr>
<td>D(GPP)</td>
<td>• A good practice point (GPP) is a recommendation for best practice based on the experience of the Guideline Development Group</td>
</tr>
<tr>
<td>IP</td>
<td>• Recommendation from NICE Interventional Procedures guidance</td>
</tr>
</tbody>
</table>

Levels of evidence for intervention studies

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Type of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1**</td>
<td>• High-quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1*</td>
<td>• Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1–</td>
<td>• Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2**</td>
<td>• High-quality systematic reviews of case–control or cohort studies • High-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal</td>
</tr>
<tr>
<td>2*</td>
<td>• Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2–</td>
<td>• Case–control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3</td>
<td>• Non-analytical studies (for example, case reports, case series)</td>
</tr>
<tr>
<td>4</td>
<td>• Expert opinion, formal consensus</td>
</tr>
</tbody>
</table>
Classification of recommendations on diagnostic tests

<table>
<thead>
<tr>
<th>Grade</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A(DS)</td>
<td>• Studies with level of evidence Ia or Ib</td>
</tr>
<tr>
<td>B(DS)</td>
<td>• Studies with level of evidence II</td>
</tr>
<tr>
<td>C(DS)</td>
<td>• Studies with level of evidence III</td>
</tr>
<tr>
<td>D(DS)</td>
<td>• Studies with level of evidence IV</td>
</tr>
</tbody>
</table>

DS, diagnostic studies.

Levels of evidence for studies of the accuracy of diagnostic tests

<table>
<thead>
<tr>
<th>Levels of evidence</th>
<th>Type of evidence</th>
</tr>
</thead>
</table>
| Ia                 | • Systematic review (with no or minor variations in the directions and degrees of results between studies) of level-1 studies, which are studies that use:  
|                    | – a blind comparison of the test with a validated reference standard (gold standard)  
|                    | – a sample of patients that reflects the population to whom the test would apply |
| Ib                 | • Level-1 studies |
| II                 | • Level-2 studies, which are studies that have only one of the following:  
|                    | – the population is narrow (the sample does not reflect the population to whom the test would apply)  
|                    | – a poor reference standard is used (defined as that where the ‘test’ is included in the ‘reference’, or where the ‘testing’ affects the ‘reference’)  
|                    | – the comparison between the test and reference standard is not blind  
|                    | – the study is a case–control study  
|                    | • Systematic reviews of level-2 studies |
| III                | • Level-3 studies, which are studies that have at least two of the features listed for level-2 studies  
|                    | • Systematic reviews of level-3 studies |
| IV                 | • Consensus, expert committee reports or opinions and/or clinical experience without explicit critical appraisal; or based on physiology, bench research or ‘first principles’ |
Appendix B: The Guideline Development Group

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Patient/Carer Representative, Trustee, British Cardiac Patients Association

Dr N Sulke
Consultant Cardiologist, East Sussex Hospitals NHS Trust, Eastbourne
Appendix C: The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring its quality. The Panel includes experts on guideline methodology, health professionals and people with experience of the issues affecting patients and carers. The members of the Guideline Review Panel were as follows.

**Dr Peter Rutherford (Chair)**
Senior Lecturer in Nephrology, University of Wales College of Medicine

**Dame Helena Shovelton**
Chief Executive, British Lung Foundation

**Dr Rob Higgins**
Consultant in Renal and General Medicine, University Hospitals Coventry and Warwickshire NHS Trust, Coventry

**Mrs Fiona Wise**
Chief Executive, Ealing Hospital NHS Trust

**Dr John Young**
Medical Director, Merck Sharp & Dohme (MSD)
## Appendix D: Technical detail on the criteria for audit

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Exception</th>
<th>Definition of terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 100% of people presenting to primary or secondary care with a history of hypertension, heart failure, diabetes or stroke and noted to have an irregular pulse to have an ECG performed and any new diagnosis of AF recorded.</td>
<td>None.</td>
<td>Percentage of patient records with a new diagnosis of AF made following an ECG made on the basis of detection of an irregular pulse.</td>
</tr>
<tr>
<td>2. 100% of AF patients in whom a rate or rhythm control is initiated to have their involvement in which treatment strategy is pursued recorded.</td>
<td>Postoperative or haemodynamically unstable patients, or those otherwise unable to engage in a decision-making process.</td>
<td>Percentage of patient records with a record of involvement of the patient in the decision-making process.</td>
</tr>
<tr>
<td>3. 100% of patients who are prescribed digoxin as initial monotherapy for rate control to have the reason for this prescription recorded where it is not obvious (e.g. sedentary patient, presence of contraindication to alternative agents).</td>
<td>None.</td>
<td>Percentage of patient records with a prescription of digoxin for initial rate control monotherapy where the reason for digoxin prescription is because: a) sedentary patient; b) presence of contraindications to beta-blockers or rate-limiting calcium antagonists; c) other reasons.</td>
</tr>
<tr>
<td>4. 100% of patients to be assessed for risk of stroke/thromboembolism and administered thromboprophylaxis according to the stroke risk stratification algorithm (see Appendix E below) and have this assessment and any antithrombotic therapy recorded.</td>
<td>Haemodynamically unstable patients or those in whom assessment is impossible or inappropriate.</td>
<td>Percentage of patient records with a record of risk assessment and thromboprophylaxis consistent with the stroke risk stratification algorithm.</td>
</tr>
<tr>
<td>5. As 4 above.</td>
<td>As 4 above.</td>
<td>As 4 above.</td>
</tr>
</tbody>
</table>
Appendix E: The algorithms

AF care pathway

No symptoms – targeted screening leads to clinical suspicion of AF

- 12-lead ECG to confirm diagnosis
- Further investigations and clinical assessment (including risk stratification)
- Further management* in community and/or secondary care
- Develop management plan
- Follow-up
- Continued AF or sinus rhythm at follow-up?
  - Sinus rhythm
    - Assess need for further follow-up
    - Need for further follow-up? [Yes]
      - Further follow-up*
      - Regular review
      - Further referral
    - Continued AF
      - OR
      - Further management to include rate or rhythm control treatment strategy and appropriate antithrombotic therapy based on stroke risk stratification algorithm.
      *Further follow-up for co-existing conditions and assessment for ongoing anticoagulation.

Symptomatic presentation and clinical suspicion of AF

- Emergency referral if appropriate

Further investigations and clinical assessment (including risk stratification)

- Further management* in community and/or secondary care
- Develop management plan
- Follow-up
- Continued AF or sinus rhythm at follow-up?
  - Sinus rhythm
    - Assess need for further follow-up
    - Need for further follow-up? [Yes]
      - Further follow-up*
      - Regular review
      - Further referral
  - Continued AF
    - OR
    - Further management to include rate or rhythm control treatment strategy and appropriate antithrombotic therapy based on stroke risk stratification algorithm.
    *Further follow-up for co-existing conditions and assessment for ongoing anticoagulation.
Treatment strategy decision tree

Confirmed diagnosis of AF

Further investigations and clinical assessment including risk stratification for stroke/thromboembolism

Paroxysmal AF  Persistent AF  Permanent AF

Rhythm control  OR  Rate control

Remains symptomatic

Failure of rhythm control
Cardioversion treatment algorithm

Transthoracic echocardiographic examination to be performed in all patients being considered for rhythm control treatment strategy with cardioversion

Patients scheduled for elective cardioversion

Is onset less than 48 hours

Yes

Heparin

Is the patient at high risk of AF recurrence or stroke/thromboembolism?

Yes

Pharmacological cardioversion with amiodarone or electrical cardioversion

No

Pharmacological cardioversion with flecainide or electrical cardioversion

Is onset confirmed as less than 48 hours?

Yes

Post-cardioversion anticoagulation not necessary

No

The advantages and disadvantages of both electrical and pharmacological cardioversion should be explained to patients before deciding which treatment to perform

High risk of stroke/thromboembolism: i) previous TIA or ischaemic CVA or thromboembolism, or ii) age ≥75 with diabetes or vascular disease or hypertension, or iii) clinical evidence of valve disease, heart failure, and impaired left ventricular function on echocardiography

Warfarin (INR = 2.5, range 2.0 to 3.0) for 4 weeks

No

Perform electrical cardioversion without amiodarone or sotalol

Yes

Pre-load with amiodarone or sotalol before performing electrical cardioversion

Is the patient at high risk of cardioversion failure?

No

Heparin

OR

Warfarin (INR = 2.5, range 2.0 to 3.0) for at least 3 weeks

OR

TOE-guided cardioversion

Decide appropriate use of TOE-guided cardioversion and anticoagulant based on practicality, contraindications, bleeding risk and patient choice

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Persistent AF treatment algorithm

Persistent AF diagnosed by 12-lead ECG with successful restoration of sinus rhythm following cardioversion

- What is the stroke and thromboembolic risk?
  - Determine stroke and thromboembolic risk and administer appropriate thromboprophylaxis

- Refer to stroke risk stratification algorithm

Persistent AF

Is antiarrhythmic drug treatment needed?

- Yes
  - Attempt SR maintenance with beta-blockers
  - OR
    - Cardioversion and continued rhythm control
      - OR
        - With no structural heart disease*:
          1. Class Ic
          2. Amiodarone
        - With structural heart disease*:
          1. Amiodarone

- No
  - No antiarrhythmic drug treatment
  - Treat as permanent AF
  - Refer for non-pharmacological intervention

Antiarhythmic drugs for sinus rhythm maintenance are not necessary in those with a low risk of AF recurrence.

*Drugs to be used in order indicated, depending on degree of treatment success.
**Permanent AF treatment algorithm**

1. **What is the stroke and thromboembolic risk?**
   - Determine stroke and thromboembolic risk and administer appropriate thromboprophylaxis
   - Refer to stroke risk stratification algorithm

2. **Is there a need for ventricular rate control?**
   - Attempt pharmacological rate control with beta-blocker or rate-limiting calcium-antagonist
   - Yes

3. **Target resting heart rate < 90 (<100 bpm for recent-onset AF)**
   - Target exercise heart rate < 110 bpm (inactive), 200 – age (active)
   - Digoxin should not be used as initial monotherapy, except in sedentary patients

4. **Is there a need for further ventricular rate control?**
   - Attempt pharmacological rate control with beta-blocker or rate-limiting calcium-antagonist and digoxin
   - Normal activities alone
   - During exercise

5. **Normal activities alone**
   - Attempt pharmacological rate control with beta-blocker or rate-limiting calcium antagonist and digoxin

6. **During exercise**
   - Attempt pharmacological rate control with rate-limiting calcium-antagonist and digoxin

7. **Is there a need for further ventricular rate control?**
   - Yes

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**Paroxysmal AF treatment algorithm**

- Diagnosis by ECG, Holter-monitor or event recorder, depending on frequency of paroxysms

  - What is the stroke and thromboembolic risk?
    - Determine stroke and thromboembolic risk and administer appropriate thromboprophylaxis
      - Refer to stroke risk stratification algorithm

  - Paroxysmal AF
    - Is antiarrhythmic drug treatment appropriate?
      - Yes
        - Attempt suppression with beta-blockers
      - No
        - OR
          - Treatment failure?
            - Yes
              - Refer for non-pharmacological intervention
            - OR
              - Offer pill-in-pocket or no treatment
                - Consider referral in those with lone AF, those with an underlying electrophysiological disorder or those in whom drug treatment fails.

- With no structural heart disease*:
  1. Class Ic
  2. Sotalol
  3. Amiodarone

- With coronary artery disease*:
  1. Sotalol
  2. Amiodarone

- With LV impairment*:
  1. Amiodarone

*Drugs to be used in order indicated, depending on degree of treatment success.
Haemodynamic instability secondary to AF treatment algorithm

1. Confirm diagnosis and attempt to establish aetiology of acute haemodynamic instability secondary to AF.

   - Diagnosis to be confirmed by ECG. Check electrolytes and review CXR.

2. Is the situation life-threatening?
   - Yes: Emergency electrical cardioversion.
   - No:
     - Is the AF recent onset or permanent?
       - Permanent: Pharmacological rate control:
         1. Beta-blockers or rate-limiting calcium antagonists
         2. Amiodarone

       - Recent-onset: Electrical cardioversion.

     OR Pharmacological cardioversion with amiodarone.

3. Pharmacological cardioversion to be considered if there is a delay in organising electrical cardioversion. For those with known WPW flecainide may be used as an alternative agent for pharmacological cardioversion.
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**Stroke risk stratification algorithm**

Persistent, paroxysmal or permanent AF

- Determine stroke/thromboembolic risk

**High risk**
- Previous ischaemic stroke/TIA or thromboembolic event
- Age ≥ 75 with hypertension, diabetes or vascular disease*
- Clinical evidence of valve disease, heart failure, or impaired left ventricular function on echocardiography♣

**Moderate risk**
- Age ≥ 65 with no high-risk factors
- Age < 65 with diabetes, hypertension or vascular disease♣

**Low risk**
- Age < 65 with no moderate or high risk factors

- Consider anticoagulation
- Either anticoagulation or aspirin can be considered
- Aspirin 300 mg/day if no contraindications

- Are there any contraindications to warfarin?
  - No
    - Anticoagulate with warfarin, target INR = 2.5 (2.0 to 3.0)
  - Yes
    - Reassess risk stratification whenever individual risk factors are reviewed

Assess risk, and reassess regularly.

Note that risk factors are not mutually exclusive, and are additive to each other in producing a composite risk. Since the incidence of stroke and thromboembolic events in patients with thyrotoxicosis appears similar to other aetiologies of atrial fibrillation, antithrombotic treatments should be chosen based on the presence of validated stroke risk factors.

*Owing to lack of sufficient clear-cut evidence, treatment may be decided on an individual basis, and the physician must balance the risk and benefits of warfarin versus aspirin. As stroke risk factors are cumulative, warfarin may, for example, be used in the presence of two or more moderate stroke risk factors. Referral and echocardiography may help in cases of uncertainty.

*An echocardiogram is not needed for routine assessment, but refines clinical risk stratification in case of moderate or severe left ventricular dysfunction and valve disease.

*Coronary artery disease or peripheral artery disease.